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ABSTRACT

While alcoholism is no longer regarded as a unitary disorder, conventional measures of congition and personality have yet to be shown capable of consistently predicting clinical outcomes. To investigate cognitive dysfunction and locus of control as predictors of post treatment outcome in a large sample of alcoholics, 106 alcoholics (74 men, 32 women) were interviewed and assessed twice during an 8-10 week inpatient program. Subjects completed two measures of locus of control (the Rotter Internal-External Scale-IE, and a drinking-related locus of control scale-DRIE), and two measures of cognitive dysfunction (the Booklet Rod and Frame Test-BRF, and the Patterned Cognitive Impairment Test Battery-PCIT). Other demographic and psychological measures also were administered at the beginning and end of treatment, as was the PCIT. Treatment outcome, focusing on weeks of abstinence, was assessed at 3 and 12 months. Significant and independent shifts in the internal direction were found on both measures of locus of control from the first to second testing. Significant improvement on the BRF was similarly observed. The relationship between the independent variables and indices of treatment participation was weak. DRIE fared better than IE in predicting treatment outcome in 103 patients assessed for drinking outcome 12 months following discharge. The two cognitive measures also significantly predicted drinking outcome at 12 months. Ability to predict outcome was enhanced when interactions between the two cognitive measures and locus of control were considered, and when multivariate analyses were employed including nonlinear relationships between these measures and treatment outcome. (Author/BL)

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COGNITIVE DYSFUNCTION, LOCUS OF CONTROL AND TREATMENT OUTCOME AMONG CHRONIC ALCOHOLICS

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PAPER SUMMARY

Cognitive Dysfunction, Locus of Control and Treatment Outcome Among Alcoholics

While alcoholism is no longer regarded as a unitary disorder, conventional measures of cognition and personality have yet to be shown capable of consistently predicting clinical outcomes. The present study evaluated the ability of two measures of locus of control (Rotter's IE scale and a drinking-related locus of control scale - DRIE) and two measures of cognitive dysfunction (Booklet Rod and Frame test - BRF and the Patterned Cognitive Impairment Test Battery - PCIT) to predict therapy involvement during, and treatment outcome following, an abstinence-oriented inpatient program. Three of these measures were administered twice to 106 patients (74 males, 32 females) near the beginning and again near the end of treatment. PCIT was administered once, at the time of the second assessment on the other three indices. A range of other sociodemographic and psychological data were also collected. Significant and independent shifts in the internal direction were found on both measures of locus of control from the first to second testing. Significant 'improvement' on BRF was similarly observed. The relationship between the independent variables and indices of treatment participation was weak. DRIE fared better than IE in predicting treatment outcome in 103 patients assessed for drinking outcome 12 months following discharge. The two cognitive measures also significantly predicted drinking outcome at 12 months. Ability to predict outcome was enhanced when interactions between the two cognitive measures and locus of control were considered and when multivariate analyses were employed including nonlinear relationships between these measures and treatment outcome. The need for further research relating locus of control and cognitive impairment to treatment processes and post-treatment experiences that contribute to relapse is discussed. Such research could be expected to add to our understanding of relapse and may provide guidelines for the design of treatment programmes tailored to the needs of psychometrically identifiable subgroups of patients.

COGNITIVE DYSFUNCTION, LOCUS OF CONTROL AND TREATMENT OUTCOME AMONG ALCOHOLICS[1]

A wide variety of psychological measures have been used to investigate individual differences within populations of alcoholics undergoing treatment. While extant literature has played a part in demolishing the belief that alcoholism is a unitary disorder, conventional measures of cognition and personality have yet to be shown capable of consistently predicting clinical outcomes (1,2,3). Of the variables pertaining to the person, the most stable predictors of treatment outcome are sociodemographic indices (e.g. education, occupation, and marital status) (4). Social functioning at the time of admission and the severity of drinking problems appear to be additional relevant factors (5). However, even when a number of these variables are combined with measures from other domains (e.g. treatment setting, post-treatment environment) 70 to 80% of variance in treatment outcome is typically left unexplained (5). As a consequence, it is not clear which patient variables need to be controlled when outcomes of different treatment approaches are compared and there is insufficient information to provide a framework for the development of interventions tailored optimally to individuals or clinically distinct subgroups.

While the inability to identify prognostically relevant psychological variables might illustrate the poverty of trait approaches to the prediction of behavioural outcomes, it could equally be contended that the most appropriate constructs have yet to be addressed.

A large body of literature (e.g. 6,7) documents an association between long-term heavy drinking and the deterioration and atrophy of brain tissue. To some extent, this organic impairment is reflected in defective cognitive functioning, particularly in functions in which frontal and nondominant cortical tissue is considered to play a major role (8,9). Because many alcoholics

evidence these deficits, deficits which are associated with less effective adjustment to the tasks and demands of daily life, the question arises as to whether the presence of 'organicity' during treatment carries with it a poorer prognosis. Strangely, considering the extensive literature on cognitive dysfunction in alcoholics, this issue has been little investigated.

Although deterioration sufficient to attract a clinical diagnosis of 'mental deterioration' or 'organic brain damage' has been convincingly linked with a poor prognosis (9,10), the case is weaker for less severe deficits (11,12). The only work that unequivocally supports the proposed association between cognitive dysfunction and subsequent outcome is that of Gregson and Taylor (13). Gregson and Taylor showed that the degree of cognitive dysfunction, as measured by the Patterned Cognitive Impairment Test (PCIT) (14) during in-patient treatment, predicted at a high level of significance whether or not ex-patients were employed and abstinent 6 months after discharge.

Locus of control is another construct which has been considered in relation to alcoholism, and like cognitive dysfunction, holds some promise as a prognostic indicator.

Locus of control refers to individuals' generalized expectancies about whether or not they have control or power over what happens to them. Assisting alcoholics to exert control over events that affect them is a concern of many treatment approaches. In part, this involves assisting patients to identify causal relationships between personal behaviour and subsequent events (i.e. the fostering of an internal control orientation). If this in turn improves patients' capacities to understand and manage their lives after they leave therapy programmes, then it would seem reasonable to hypothesize that an internal control orientation at the termination of treatment would predict a positive outcome.

The relationship of locus of control to treatment outcome in alcoholics may not, however, be straightforward. Rohsenow and O'Leary (15) remind us that many alcoholics assert that they can control their drinking behaviour, in spite of evidence to the contrary. If this unrealistic expectation of control is reflected in measures of internal control, then it may be that the goal of increasing internality is not desirable. Indeed, one influential treatment framework, Alcoholics Anonymous, places a great deal of emphasis on convincing patients that they are powerless over alcohol and its effects on their lives. It may be that both extreme external and internal control orientations are associated with a poor prognosis.

The relationship between locus of control and both treatment participation and treatment outcome has not been extensively investigated. Rohsenow and O'Leary reviewed the literature (15) and conclude that further research is needed and that it should focus on the relationship of locus of control scores (including change scores during treatment) to a variety of long-term treatment outcomes. They emphasize the importance of rigorously controlling related variables since factors such as age, education, and organic damage might more parsimoniously account for differences among groups.

While the majority of research using locus of control has treated the concept as a personality trait and has been concerned with its relationship to other psychological constructs and its capacity to predict behaviour in a wide variety of settings, its origin lies within social learning theory where it was conceptualized somewhat differently. Within social learning theory (16), locus of control is viewed as a broad expectancy, influencing behaviour to varying degrees in a wide range of situations. In any given situation, the expectancy of success or failure is seen as a composite of information that the individual has from past and current experience with that situation, from experience with similar situations, and finally, from the individual's expectancies about control over situations in general. In

other words, locus of control was not intended to be a precise predictor of behaviour in a given situation. For this purpose, information is required about more specific expectancies. However, the more ambiguous a particular situation is for an individual, the less more specific expectancies will be able to operate and the greater the reliance on generalized expectancies. These considerations from social learning theory should be borne in mind when attempts to predict drinking outcome from locus of control scores are made. After all, alcoholics have had a great deal of experience with drinking situations. It could well be that more specific expectancies are of greater predictive value.

Following Rotter's (17) suggestion that by developing measures of more specific expectancies, prediction can be enhanced in circumscribed areas, Keyson and Janda developed a drinking-related locus of control scale (DRIE)[2]. Donovan and O'Leary have evaluated the factor structure, reliability, and validity of this scale.(18) They note that the two main factors refer to situations which are important in precipitating relapse following treatment. Although apparently yet untested, it would seem that there are strong theoretical reasons for hypothesizing that this measure could add to our ability to predict post-treatment outcome in alcoholics.

The present study investigated the ability of cognitive dysfunction and locus of control to predict post-treatment outcome in a large sample of alcoholics. In part, it attempted to replicate Gregson and Taylor's research, extending the followup period to 12 months and including female subjects.[3] Both generalized and drinking-related measures of are included.

METHOD

Subjects

106 alcoholics, comprising 74 men having a mean (±SD) age of 42.0±13.7 years and 32 women having a mean age of 46.7±12.4, were interviewed and assessed during an 8 to 10 week in-patient programme. Detailed description of the

sample is given elsewhere (3). At the time of their first assessment, the subjects reported a mean of 12.2±25.8 days of abstinence. The patients were taken off all psychotropic medications from the time of admission.

The treatment programme stressed abstinence as the only viable treatment outcome. It was based on Alcoholics Anonymous (AA) philosophy and group therapy. The programme has been described previously (3,13).

The 106 subjects completed the full programme. During this time, a further 26 patients left against staff advice and prior to the completion of testing. An additional 6 patients completed the programme but were excluded from the sample: 1 was mentally subnormal and could not comply with the test instructions; 1 refused to participate; and 4 were either too ill or on leave at the time their assessment was scheduled.

Procedure

All subjects were interviewed individually by the author between the 6th and 14th days after admission. At this time, patients also responded to written questions to elicit biographical and social data, information on drinking behaviour, attitudes towards AA, and severity of drinking problems (self-rating). A series of scales was also administered covering the severity of drinking problems, alcohol-related physical and psychological symptoms, emotional stress (e.g. anxiety and depression) and social functioning (e.g. attendance at social functions and social interests) for the month before admission.[4] At the interview, an individually administered cognitive test was also given (BRF).[5] This test, a booklet version of the Rod and Frame test, although still in the development stage, has been shown to predict relapse in alcoholics (3). BRF was readministered 5 to 6 weeks later, along with another test of cognitive dysfunction (PCIT) (14). A series of questionnaires was administered to small groups of patients 1 to 2 days after they had been tested individually. The questionnaires (administered twice)

included locus of control (IE) (19), drinking-related locus of control (DRIE), the Time Reference Inventory (20), the Future Events Test (21), and a questionnaire about religious attitudes and beliefs (22).

Adequate outcome data was obtained for 103 of the original 106 patients at 3 months after discharge and for 100 patients at one year. 'Adequate' data refers to a minimum of either the patient's self report plus one independent account, or two independent assessments. On the few occasions where there were discrepancies, the worst outcome was considered to be valid.

Treatment outcome was assessed in a variety of ways. In the analyses reported in this paper, two methods were used: (a) weeks of abstinence prior to the first drink ('relapse') and (b) 3-way classification (relapsed, moderated drinking, abstinent) at 3 and 12 months. Abstinence was defined as no alcohol intake in the 3 month period immediately prior to the followup contact. Moderated drinking was defined as light-to-moderate consumption, considered by referees to constitute a marked improvement over pre-treatment levels of intake during the 3 months prior to contact. Relapsed patients were defined as those drinking at pre-treatment levels (or worse), or those who had been drinking at such levels prior to a treatment readmission or imprisonment.

RESULTS

Overall Treatment Outcome

Of the 103 subjects who completed therapy and were traced at 3 months, 29 had relapsed, 16 were moderated drinkers, and 58 were abstinent. Numbers in these categories at one year were respectively 38, 14, and 48. Of the 38 subjects who relapsed at the one year point, at 3 months 21 were relapsed subjects, 4 were moderated subjects and 13 were abstinent. Corresponding figures for the 14 moderated subjects were 2 relapsed, 6 moderated and 6 abstinent. Of the 48 abstinent subjects, 5 were previously relapsed, 6 moderated and 37 abstinent.

Test Performance During Treatment

Performance of male and female subjects on the individually administered tests and the locus of control questionnaires is summarized in Table 1. Subjects included are the 71 males and 32 females who were traced 3 months following discharge. All subjects had completed the PCIT, BRF, IE, and DRIE.

Table 1 about here

Male versus female differences on these measures were assessed by t-tests. Only BRF, on the 1st testing, reached the .05 level of significance ($t(101) = 2.26$).

Change or 'shift' scores for each patient were calculated by subtracting the score at the first test occasion from that obtained at the second. Overall shift scores were converted into standard deviate form (Z-scores) by the formula $\frac{(\sqrt{n}).\bar{m}\ \text{shift}}{\sigma\ \text{shift}}$.

With the exception of BRF (first test occasion) gender differences were not significant on any of the measures listed in the method section. Consequently, in subsequent analyses reported here, male and female data are combined.

Change scores for BRF, locus of control and the other questionnaires administered during hospitalization are given in Table 2. The Z-score (shift) for the DRIE total scale score was - 10.8, indicating a highly significant shift in the internal direction over the course of therapy. Significant changes were also found on IE locus of control (again internal shifts), BRF (less mean rotation), and one of the factor scores from the questionnaires on religious attitudes (increased religiosity).

Table 2 about here

A principal components analysis of the shift score data cited in Table 2 suggested that changes on the majority of measures occurred independently of changes on other indices[6]. The only instance where changes on two questionnaires occurred together involved IE locus of control and Future Events. In other words, shifts in the internal direction were associated with an increase in future orientation.

A canonical correlation analysis was conducted to establish the extent to which changes on the various measures could be predicted from initial performance on the same indices[6]. In situations where there are multivariate sets of dependent and independent variables, simple correlation analyses are inappropriate and canonical correlation is the method of choice (23). The largest canonical correlation explained 70 percent of the variance shared by the first two linear combinations of variables (R = .84, p <.001). This primarily reflects the strong relationship between DRIE at the start of the treatment and change on this measure (r = -.80). Specifically, the more external subjects were initially, the more they changed (in the internal direction) over the course of therapy.

Initial scores on DRIE failed to predict changes in IE or in any of the other measures. To lesser the varying degrees, the pattern of initial scores on each of the other tests predicted change on that measure and not other measures included in the analysis. In the case of IE locus of control (R = .23), the zero-order correlation was -.32. This is in the same direction as that pertaining to DRIE - DRIE (change), but considerably weaker.

Test Performance and Treatment Outcome

Thirty-five independent variables assessing aspects of the subjects' sociodemographic background, drinking pattern and drinking-related symptoms at intake, and a number of psychological processes and attitudes at two periods during the

treatment programme, were included in stepwise multiple regression analyses. The independent variables are listed in Table 3.

Table 3 about here

The results of two regression analyses are given in Table 4. Analysis A used weeks of abstinence prior to the first drink (relapse) as the dependent variable. Analysis B used the three-way classification (abstinent, moderated drinking, relapsed) on the assumption that these outcomes constituted an ordinal scale. A preliminary analysis excluding the interaction terms and change scores yielded a multiple correlation coefficient of .49, accounting for 24.5 percent of the total variance. With the additional measures included, the predictive capability of the regression model was substantially increased ($R = .62$, $R^2 = 38$ percent for both Analysis A and B).

Table 4 about here

Although none of the independent variables account for a large amount of treatment outcome variance, cognitive dysfunction as indexed by the cross-product term PCIT x BRF(2) emerged as a dominant and significant predictor in both analyses. PCIT also entered into Analysis B on its own account and taken together with PCIT x BRF(2), indices of cognitive dysfunction account for nine percent of the variance.

Locus of control measures (IE(1), IE(2), IE-Change and DRIE-Change) did not feature as significant predictors of drinking outcome. However IE locus of control, when considered in relation to cognitive dysfunction (in the cross-product term BRF(2) x IE(2)), did emerge as a significant predictor in Analysis A. DRIE scores from the beginning and end of treatment were not included in the regression analyses.

To obtain a clearer picture of the relationship between cognitive dysfunction and treatment outcome and to investigate further the possible prognostic role of locus of control, a series of contingency table analyses were conducted.

Table Five shows how performance on PCIT and BRF(2) relates to treatment outcome at three months following discharge. The score ranges used previously by Gregson and Taylor (13) were used to define PCIT categories, namely low -6.71 to -2.55; medium -2.50 to -1.00; high -.06 to 1.72. A low score indicates cognitive impairment. The BRF score distribution was dichotomized; subjects having < 10 degrees rotation were assigned to the low group and those with scores > 10 to the high group. This division was chosen a priori and was based on an analysis with a different sample that suggested that a score of 10 marked a cut-off point between two subpopulations, one which changes on this measure over time in treatment, the other which is stable.[5] In contrast to PCIT, a high score on BRF indicates a poor performance.

Table 5 about here

The Chi Square analysis conducted on the Table 5A data was highly significant ($\chi^2(4) = 24.76$, $p < 001$, $\phi^2 = .24$). Twelve month outcome data tabulated in the same way showed a very similar pattern of cell representation ($\chi^2(4) = 12.81$, $p < .02$, $\phi^2 = .13$). A 2x3 Chi Square analysis conducted on PCIT in relation to treatment outcome at three months ($\chi^2(2) = 6.06$, $p < .05$) corroborated the stepwise regression analysis where PCIT emerged as a significant predictor in its own right. While 21 percent of low scorers on BRF(2) at three months, and 31 percent at 12 months, had relapsed relative to 36 and 47 percent of high scorers on the same two test occasions, Chi Square analyses failed to reach the .05 level of significance.

Although PCIF alone predicted post treatment outcome, it is evident from Tables 4 and 5 that predictive power is enhanced when both cognitive measures are

considered together. Inspection of the cells in Table 5 indicates that a good performance on both measures carries the best prognosis and a poor performance on both carries the worst.

Table 6A shows the relationship between BRF(2), IE(2), and 3-way treatment outcome 12 months after discharge.

IE scores were trichotomized to give three approximately equal-sized groups: internals (low scores, 0-4), intermediates (5-10), and externals (high scores, 11-21). The 3-way division was used to test the hypothesis that locus of control might bear a non-linear relationship to treatment outcome. BRF was included to provide more data on the interaction with IE in relation to treatment outcome as suggested in the earlier regression analysis using the same psychological measures but a different index of treatment outcome.

Table 6 about here

The 3 x 3 x 2 Chi Square analysis conducted using the Table 6A data shows that performance on IE and BRF bears a significant predictive relationship to treatment outcome at 12 months. This relationship is seen more clearly in Table 6B where outcomes in the respective cells are expressed as a probability of relapse. A 3 (IE) x 3 (drinking outcome) Chi Square analysis corroborated the earlier regression analysis finding that on its own IE was a poor predictor of outcome ($p > .05$). The most obvious feature of these data is the poorer treatment outcome for intermediate IE-high BRF subjects and the tendency for intermediate IE-low BRF subjects to have better outcomes. Thus, there appears to be some corroboration for the view that extreme internal and external control orientations are associated with a poor outcome. However, this applies only to those subjects with better BRF performance. Among poor BRF performers there is a tendency for this relation-

ship to be reversed.

DRIE (2) was also evaluated in relation to BRF and 3-way treatment outcome at 12 months. The score ranges defining the 3 DRIE groups were as follows: internals (0), intermediates (1 and 2), and externals (+2). The Chi Square analysis conducted on these data (see Table 7A) was highly significant ($p < .001$). Although stronger than was the case with IE, DRIE per se did not predict outcome ($\chi^2(4) = 8.01$). However, 3 (DRIE) x 3 (drinking outcome) with the low BRF subjects was significant ($\chi^2(4) = 11.85$, $p < .05$). This relationship did not hold for high BRF subjects.

Table 7 about here

Inspection of Table 7A reveals that the significant overall Chi Square resulted primarily from an under-representation of abstinent outcomes in the low BRF-internal DRIE cell, an over-representation of abstinent outcomes in both the low BRF-external DRIE, and the low BRF-intermediate DRIE cells, and the over-representation of relapsed drinkers in the high BRF-internal DRIE cell. This is viewed more clearly in Table 7B where it is evident that the best prognosis at 12 months is associated with an external or intermediate score on the DRIE coupled with a low score (better performance) on BRF. A contingency table analysis was also conducted on 3-way treatment outcome at 3 months after discharge. A similar pattern of results emerged to that found at 12 months although the relationship was weaker (overall $\chi^2(4) = p < .02$, $\phi^2 = .12$).

DISCUSSION

The association between cognitive dysfunction and poor treatment outcome is a major finding of the present study. While the relationship is of only moderate strength, the cognitive impairment - relapse hypothesis is strongly corroborated

in that measures of cognitive dysfunction emerged as significant predictors when considered in relation to a wide range of other independent variables, when different measures of outcome were used at different followup intervals, and when different forms of analysis were employed.

Although indices of cognitive dysfunction emerged as significant predictors in both regression analyses, in contrast to the findings of Gregson and Taylor (13), PCIT was not as strongly implicated. In part, this was a consequence of including the cross-product term (PCIT x BRF) in the analyses. Because this composite index and PCIT share 44 percent common variance, its entry into the stepwise analysis before the PCIT scores removed this shared variance, thus deflating their overall contribution to the variance. The reduction in the predictive power of PCIT scores may also be explained in part by the finding that few of the alcoholics in the present study had scores indicative of severe impairment. Because of the over-all reduction in PCIT variance, its covariance with dependent variables was diminished. Cross-validation shrinkage, typical of multiple regression analyses using populations different from the original, is another possible reason for the decline in the predictive power of PCIT scores.

Unlike other studies examining the relationship between cognitive dysfunction and treatment outcome, the present study and the earlier Gregson and Taylor research used PCIT, designed specifically to detect the subtle types of cognitive impairment that characterize a large percentage of alcoholics. The over-all PCIT score is a composite of separate indices weighted on the basis of a discriminant function analysis that showed maximal discrimination between alcoholics and normal subjects. Other studies have shown less clearcut results. It may be that the tests used previously - in the main measures originally developed to discriminate between normal subjects and more obviously brain-injured groups - were not sufficiently sensitive to the intermediate patterns of dysfunction found in alcoholics.

The multivariate analyses suggested that measures of locus of control are sufficiently independent from indices of cognitive dysfunction and other significant predictors to be considered further in relation to models of relapse.

The mean scores for the two locus of control measures at the start of treatment are similar to those found in other hospitalized alcoholic groups (15). Statistically significant shifts in the internal direction on the IE scale were found over the course of treatment. This has been recorded previously in both alcoholic and non-alcoholic clinical groups undergoing therapy (15). Internal shifts, of greater magnitude, were also evident on the DRIE. Thus, it would appear that over the course of hospitalization, the majority of patients came to believe that they could cope with the drinking-related situations described in this questionnaire.

It was also found that the more external subjects were initially on the IE scale, the greater their internal shift over the course of therapy. This was even more apparent in the case of DRIE. In part, this may have been a consequence of ceiling effects - i.e. externals, with their higher scores, had more room for change. Change on IE and DRIE during hospitalization did not, however, predict drinking outcome.

One implication of the locus of control shifts is that where comparisons are sought between alcoholics and other groups, careful consideration needs to be given to the timing of test administration. This type of comparative investigation would, however, appear to be in the tradition of the search for the alcoholic personality. Does it really matter if this or that alcoholic sample is, on average, slightly (albeit 'significantly') more internal or external than this group or that? Even if there are moderate mean differences in some instances, their score distributions are likely to show considerable overlap. More relevant are the implications of given score ranges for different treatment approaches and prognosis.

Although generalized (IE) locus of control was found to be of little value in predicting post-treatment drinking outcomes, the regression and contingency table analyses suggested that the significance of this construct may be obscured unless more complex relationships between variables, including non-linearity and interactions with other independent variables, are considered. For example, among cognitively impaired subjects (high BRF) there was a tendency for extreme internals and externals to have better 12-month drinking outcomes than intermediate scorers. In the case of low BRF scorers, this tendency was reversed, with intermediate IE subjects having the best outcomes. In other words, there was some support for the hypothesis that extreme internality and externality carry a poor prognosis, but only among cognitively 'intact' patients. Why these complex relationships should emerge is not obvious at this stage. Too little is known of the meaning of different scores on these measures in alcoholic populations. They suggest an area where more detailed investigation could be usefully conducted and caution against the more simplistic analyses typically reported in the literature.

As predicted from social learning theory, DRIE performed better as a predictor of drinking outcome. From Table 7 it is evident that external and intermediate scores on DRIE had a significantly better outcome than internals. This pattern was not significant in the case of high BRF subjects however. These findings are interesting because they suggest that among more neuropsychologically intact patients, self-evaluations of the amount of control that they consider that they will have over their drinking behaviour and over drinking-related intra- and interpersonal environmental hazards, appear not be borne out in their behaviour after leaving hospital. Self evaluations in this area by cognitively dysfunctional subjects, on the other hand, appear more likely to be translated into reality. This is contrary to what one might expect. However, it should be noted that the BRF, as a measure of cognitive dysfunction, is still in the developmental stage. These findings appear to corroborate the view that fostering a belief that alcoholics have control over alcohol-related behaviours

is ill-advised, although this may be confined to neuropsychologically intact samples.

It would seem, on the basis of the data reported, that DRIE could be usefully added to measures of neuropsychological impairment in future attempts to identify prognostically relevant psychological dimensions. IE locus of control would seem to offer less promise in predicting drinking outcomes. It may do better at predicting other treatment outcomes, e.g. occupational functioning or psychiatric symptomatology.

Sociodemographic variables, namely education, highest occupation attained, marital status and social functioning, also explained a modest amount of outcome variance. These are among the most consistent predictors of post-treatment outcome. It is also of interest that patient self-ratings of the severity of their drinking problems feature among the better predictors of outcome. Perhaps understanding of relapse phenomena could be enhanced if we concentrated more on our patients' views of their situation. Religious attitudes also emerged as a significant predictor in one of the regression analyses although it accounted for a trivial amount of outcome variance. Nevertheless, this area might repay further study, particularly in treatment programmes which emphasize AA or other ideologies with a strong Judeo-Christian component.

Future research should examine the influence of cognitive dysfunction on patient involvement in therapy and on post- treatment experiences that contribute to relapse. DRIE locus of control also warrants further investigation. If these constructs are shown by future research to be clinically relevant, they may provide the basis for the subdivision of alcoholic populations. It may be that these subgroupings will respond optimally to different treatment approaches. Models of relapse should also consider more carefully interactions between variables and non-linear relationships between predictors and outcome indices. It may be that we can improve on the relatively small amount of variance accounted

for in studies to date. Until we can do this, while it can be fairly asserted that alcoholic patients are a very heterogenous group, Keller's conclusion (24) that they "are different in so many ways that it makes no difference" still stands.

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FOOTNOTES

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2. Keyson, M. and Janda, L. Untitled locus of drinking control scale. Saint Luke's Hospital, Phoenix, Arizona, 1972.

3. Aspects of this research are reported elsewhere, see (3) and Abbott, M.W. Locus of control and treatment outcome among chronic alcoholics. In press, J. Alc. Stud.

4. Copies of this questionnaire are available from the author.

5. Gregson, R.A.M. and Abbott, M.W. Performance on a booklet version of the Rod and Frame Test (Unpublished Ms., 1978).

6. Abbott, M.W. Antecedent correlates of and change on two measures of Locus of Control in an alcoholic population (Paper in preparation).

TABLE 1

Cognitive and Locus of Control Performance for Males and Females[a]

	First Testing		Second Testing	
Measure	Males	Females	Males	Females
P.C.I.T.	-1·3	-1·6		
	(1·1)	(1·3)		
B.R.F.	12·3	17·8	10·5	13·5
	(8·4)	(12·4)	(8·8)	(7·8)
I.E.	9·2	8·6	7·7	7·0
	(4·0)	(3·6)	(4·4)	(4·0)
D.R.I.E.	6·6	8·5	2·2	2.5
	(4.7)	(4·9)	(2·9)	(3·0)

Note a: Means are given with standard deviations in brackets.

N = 71 (males), 32 (females).

TABLE 2

Changes in Test Performance and Insight Levels

Over the Course of Therapy

Measure	Mean Score (1st Testing)	Change Score mean	Change Score SD	Z-score (shift)	N
BRF	14·05	-2·7	8·6	-3·2*	103
IE	9.05	-1.5	3.1	-4.9*	103
DRIE (total)	7.16	-5.1	4.8	-10.8*	103
Past Extension	14.03	-1.3	7.7	-1.7	97
Future Extension	6.2	-1.2	7.6	-1.5	97
Temporal Orientation	-4.58	0.7	6.1	1.1	97
Future Events	1.75	-0.3	3.1	-1.8	102
Religiosity (F1)	20.43	0.9	5.4	1.72	102
Religiosity (F2)	-3.02	-1.2	4.9	-2.58*	102

* Z - Score (Shift) 1.96 ($p < .05$)

TABLE 3

Independent Variables used in the Stepwise Regression Analyses

1. Age
2. Gender
3. Marital Status
4. Education Level
5. Highest Occupation
6. Present Occupation
7. Religious Denomination
8. Time Since Last Worshipped
9. Years of Problem Drinking
10. Amount Consumed on a Typical Drinking Day
11. Drinking Behaviour (Questionnaire Score)
12. Drinking-Related Psychological and Physiological Symptoms (Questionnaire Score)
13. Self-Rating of Drinking Problem Severity
14. Frequency of Drinking in Previous Month
15. Number of Previous Admissions for Alcoholism
16. Social Functioning (Questionnaire Score)
17. Psychological Functioning (Questionnaire Score)
18. AA Attendance in Past (Yes/No)
19. PCIT
20. BRF (First Testing)
21. BRF (Second Testing)
22. IE Scale (First Assessment)
23. IE Scale (Second Assessment)
24. Religiosity Questionnaire - Factor 1 (Second Assessment)
25. Religiosity Questionnaire - Factor 2 (Second Assessment)
26. Interaction Term (19x21)
27. Interaction Term (19x23)
28. Interaction Term (21x23)
29. Composite Time Perspective Score (23 - 28 + 29 - 34)
30. Temporal Orientation Change Score
31. BRF Change Score
32. IE Change Score
33. DRLC Change Score
34. Religiosity Questionnaire - Factor 1 (Change Score)
35. Religiosity Questionnaire - Factor 2 (Change Score)

TABLE 4

Multiple Stepwise Regression Analyses Excluding Predictor Variables with Nonsignificant *t* Values[a]

A Weeks to Relapse

Variable	percent Variance	*t* value
Self-rating of drinking problem	3	2.29
PCIT x BRF(2)	2	2.28
Education	3	-2.15
BRF(2) x IE(2)	2	-2.09
Social Functioning	1	-2.08
Highest Occupation	3	-2.02

N = 100

B Three-way Drinking Outcome at 12 months

Variable	percent Variance	*t* value
PCIT x BRF(2)	6	-3.12
Self-rating of drinking problem	3	-2.93
Marital status	3	2.46
PCIT	3	2.23
Religiosity - Factor 1(2)	1	-2.18

N = 100

[a] with 60df, a *t* value of 2.00 is significant at the .05 level.

Note: Variables are listed in order of *t* values

TABLE 5

Cognitive Dysfunction and Treatment Outcome

A PCIT and BRF(2) in Relation to Treatment Outcome at Three Months

		PCIT								
		High			Medium			Low		
		A	M	R	A	M	R	A	M	R
BRF	Low	18 (12.6)	4 (3.5)	6 (6.3)	10 (11.9)	6 (3.3)	3 (6.0)	4 (7.0)	2 (1.9)	3 (3.5)
	High	9 (10.5)	2 (2.9)	2 (5.3)	12 (10.0)	1 (2.8)	7 (5.0)	5 (5.9)	1 (1.6)	8 (2.9)

N = 103

Note: Expected cell frequencies are given in brackets.

$\chi^2 = 24.8$, 4 df, $p < .001$

A = Abstinent, M = Moderated, R = Relapsed

B Probability of Relapse at Three Months

		PCIT			Totals
		High	Medium	Low	
BRF	Low	.21	.16	.33	.21
	High	.15	.39	.57	.36
		.20	.26	.48	

TABLE 6

IE(2) and BRF(2) in Relation to

Treatment Outcome 12 months after Discharge

A. Contingency Table

	IE (2)								
	High			Medium			Low		
	A	M	R	A	M	R	A	M	R
Low	11	1	8	14	4	5	4	4	4
BRF(2)	(8.2)	(2.4)	(6.5)	(10.3)	(3.0)	(8.2)	(7.9)	(2.3)	(6.3)
High	5	1	5	5	2	9	9	2	7
	(6.7)	(2.0)	(5.3)	(8.4)	(2.5)	(6.7)	(6.5)	(1.9)	(5.1)

Note — Expected cell frequencies are given in brackets.

$\chi^2 = 13.85$, 4df, $p < .01$

A = Abstinent, M = Moderated, R = Relapsed

B. Probability of Relapse

		IE(2)			Totals
		High	Medium	Low	
BRF(2)	Low	.40	.22	.33	.31
	High	.45	.56	.39	.47
Totals		.42	.36	.37	

N = 100

TABLE 7

DRIE(2) and BRF(2) in relation to

Treatment Outcome 12 months after Discharge

A. Contingency Table

		DRIE(2)								
		High			Medium			Low		
		A	M	R	A	M	R	A	M	R
BRF(2)	Low	15	4	5	10	0	3	4	5	9
		(9.2)	(2.7)	(7.3)	(6.9)	(2.0)	(5.4)	(10.3)	(3.0)	(8.2)
	High	5	2	4	5	1	7	9	2	10
		(7.6)	(2.2)	(6.0)	(5.6)	(1.6)	(4.5)	(8.4)	(2.5)	(6.7)

$\chi^2 = 19.84$, 4df, $p < .001$

B. Probability of Relapse

		DRIE(2)			Totals
		High	Medium	Low	
BRF(2)	Low	.21	.20	.50	.31
	High	.36	.54	.48	.47
		.30	.36	.49	

N = 100